

Determination of the Orientational Correlation Relaxation Time for Monomer and Aggregated Formations for Pyridine in Solutions by Raman Spectra

U.N. Tashkenbaev,^C F.H. Tukhvatullin, A. Jumaboev,^S and A. Absanov

*Samarkand State University
Univ.blvd, 15, 703004 Samarkand, Uzbekistan
hush-hakim@yandex.ru*

The vibrations with 992 cm^{-1} of Raman spectrum for pyridine in mixtures with iso-propyl alcohol contains the components with wave numbers 992 cm^{-1} , 998 cm^{-1} and $1001,5\text{ cm}^{-1}$ corresponding to monomer molecules (992 cm^{-1}) and different aggregations from pyridine and alcohol molecules. Polarizing measurements showed the twofold increasing band depolarization ratio of aggregation as compared with those for the monomer band. The concentration variation of the mixture allows the determination of the width of isotropic and anisotropic components for all three bands and the calculation of the orientational correlation relaxation times for monomers and aggregated formations. Results of calculations showed that for one type aggregations (band 998 cm^{-1}) correspond a twofold larger orientational correlation relaxation times and for aggregations of a second type ($1001,5\text{ cm}^{-1}$) five times larger values of monomers relaxation times. Such correlation is time of relaxation reflecting the dependence of time from dimensions of formed aggregations. The vibrational relaxation time under aggregation of molecules in mixture is decreased. The dilution of pyridine-iso-propyl alcohol mixture in heptane leads to increasing of vibrational relaxation time by equal manner for both monomers and aggregations. Analogous studies for pyridine-water solutions gave following values of orientational correlation relaxation times: for monomers 3.6 ps, for one type aggregations 6.5 ps and for aggregations other type 12,5 ps.